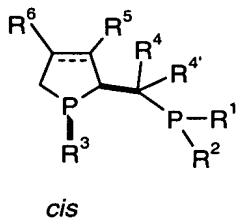


## Abstract

The invention is concerned with new phosphine ligands of formula I



wherein

R<sup>1</sup> and R<sup>2</sup> are independently of each other unsubstituted alkyl, aryl, cycloalkyl or heteroaryl, or alkyl, aryl, cycloalkyl or heteroaryl each of which independently is substituted by alkyl, alkoxy, halogen, hydroxy, amino, mono- or dialkylamino, aryl, -SO<sub>2</sub>-R<sup>7</sup>, -SO<sub>3</sub><sup>-</sup>, -CO-NR<sup>8</sup>R<sup>8'</sup>, carboxy, alkoxycarbonyl, trialkylsilyl, diarylalkylsilyl, dialkylarylsilyl or triarylsilyl; R<sup>3</sup> is alkyl, cycloalkyl, aryl or heteroaryl; R<sup>4'</sup> and R<sup>4</sup> are independently of each other hydrogen, alkyl or optionally substituted aryl; or R<sup>4'</sup> and R<sup>4</sup> together with the C-atom they are attached, form a 3-8-membered carbocyclic ring; dotted line is optionally a double bond; R<sup>5</sup> and R<sup>6</sup> are independently of each other hydrogen, alkyl or aryl, R<sup>7</sup> is alkyl or aryl; and R<sup>8</sup> and R<sup>8'</sup> are independently of each other hydrogen, alkyl or aryl; the substituents attached by the bold bonds are in *cis* relation to each other; metal complexes with such ligands in asymmetric reactions.

135984